ILLINOIS TECHNOGRAPH

January
1943

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APPROXIMATELY 30 billion kilowatt-hours of electricity will be consumed to produce all of the aluminum and magnesium we shall need for warplanes and other uses during 1943.

And every kilowatt of this vast amount of power must be *converted from A.C. to D.C.* before it can be used in the production of these metals.

Most of this conversion will be done by the Ignitron . . . *a new and more efficient mercury rectifier* that is a direct result of Westinghouse "know how" in electronics research.

The vital factor in the efficiency of the Westinghouse Ignitron is the *extreme purity* of its electrodes. The graphite anode must be 99.99% free of certain impurities . . . the mercury cathode, 99.999% free of other impurities!

If certain impurities in the mercury increase 1/1000th of one per cent . . . or in the graphite, 1/100th of one per cent . . . the proper operation of Ignitron will be affected.

Few chemists have the skill, knowledge, and special equipment to solve such a problem of almost absolute chemical purity. For this reason, Dr. E. Bruce Ashcraft . . . micro-chemistry expert of the Westinghouse Research Laboratories . . . was assigned to the job.

Dr. Ashcraft lives in a Lilliputian world of chemical analysis. Tiny test tubes, doll's-size beakers and retorts, polarizing microscopes, spectrographs, a balance that measures the weight of a *millionth of a gram* . . . these are the keys he employs to unlock the invisible world of matter.

With the help of micro-chemistry, Dr. Ashcraft has made possible the control of the extraordinary purity of all graphite and mercury used as electrodes in Ignitrons.

And now, *electronics at work* are bringing victory closer every day . . . for Ignitrons with a rated capacity of more than 3,000,000 kw are turning out the thousands of tons of aluminum and magnesium upon which our Arsenal of Democracy depends!

* * *

WE SALUTE DR. ASHCRAFT and the other thousands of scientists who are working for victory in research laboratories all over America.

We also salute the scientists of tomorrow . . . the engineering students now in college who will be called upon to rebuild a war-torn world.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pennsylvania.

TOM THUMB CHEMISTRY . . . Dr. E. Bruce Ashcraft examines a specimen weighing less than a microgram . . . approximately 1/50th the size of a grain of ordinary table salt. Dr. Ashcraft received his B.S. at Texas A&M, and his Ph.D. at Cornell University in 1937.

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JANUARY ★ 1943

This Issue . . .

THE TECHNOGRAPH

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Frontispiece . . .

The spinning of this 30-ton wheel soon will rotate the propellor and drive one of the United States Maritime Commission's new 21,000-ton oil tankers. Standing 13 feet high, the wheel is the rotor or rotating part of a 6,600-horsepower motor being built by the Westinghouse Electric and Manufacturing Company. The workman in the foreground is polishing the journal of the rotor's shaft, while the other man inspects the insulation of the stationary part of the motor. Westinghouse already has built 12 of these motors for the Sun Shipbuilding and Dry Dock Company and is now constructing 28 more. *(Cut Courtesy Westinghouse).*

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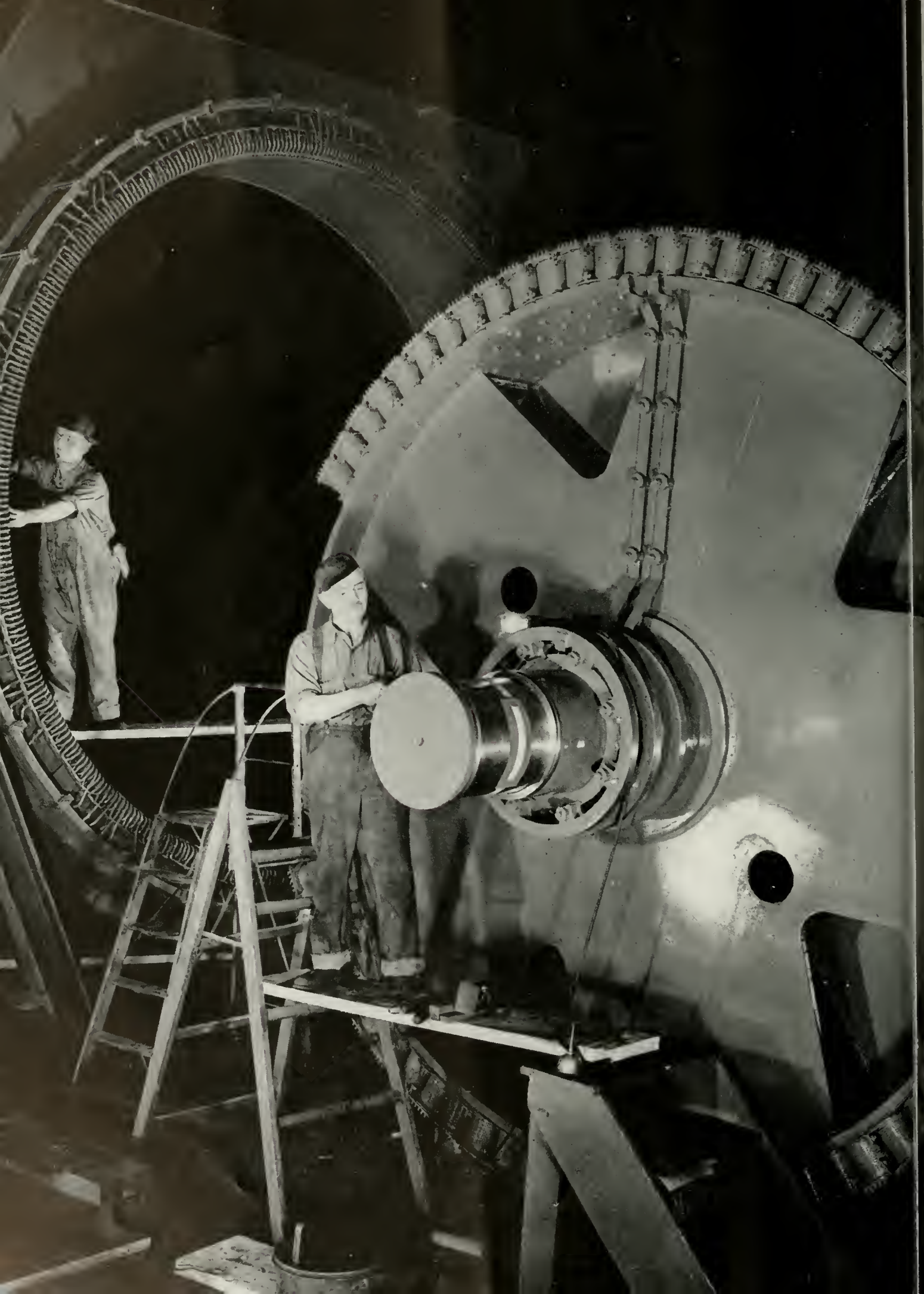
Cover . . .

Men getting instructions on halyard flags at the U. S. Navy Signal School here at the university. The man in the left foreground is sending blinker. *(Official U.S. Navy Photo).*



SHOULD ALL ENGINEERS BE IN UNIFORM?

By SOL DAVID LARKS '43

This theme was chosen as the best written by the pledges of Tau Beta Pi, Alpha of Illinois, as part of their fall initiation. This theme will compete with others from all over the country for national honors.

With the shortage of technically trained manpower already acute, a contribution toward more effective use of the existing engineering cadre can be made by putting every engineer in uniform. At the present moment, the most efficient use of the nation's engineering manpower is not being made. There do not exist, as yet, the organizational guarantees that the right man will be in the right place, in spite of the demands of present-day war.

Under the conditions of modern warfare, there is very little demarcation between the home front of production and the war front. A few hundred years ago, it was perhaps possible for the small mercenary army of those days to go off to war with relatively little effect on or relation with the economy of the home population. By contrast, the mechanized army of today demands the closest integration with industrial production. A breakdown of industrial production would mean catastrophe just as surely as would a break-through at the front. Appraising the needs of both battle and home fronts, it is clear that both need trained manpower—both need engineers.

Now let the question be put in this way: from the point of view of contribution to the war effort, how much difference is there between the engineer in a factory who helps to increase the production of machine guns and the engineer in uniform who aids in rapidly transporting these machine guns at the front? Clearly there is very little difference, if any. Then there should be no difference between them in the eyes of a nation mobilized for war. Further, it should be equally clear that, for maximum effectiveness, every engineer should be at the post where he can contribute the most. If the best communication engineers are needed at the front, that is where they should be assigned. If the best mechanical engineers are needed in the factories, then that is where they should be assigned. But is this the way this problem is being solved? Let us look into it a bit.

How is the problem being solved now? The answer is complex. Some engineers, noting the appeal of the armed forces for technicians with their specific training, have voluntarily entered, by commission or enlistment. Others, even with the knowledge that they would not work in the field for which they had been trained, have nevertheless, from high patriotic motives, joined the Army. On the other hand, thousands of young engineers of unquestioned patriotism, are entering industry because of a strong and understandable desire to acquire industrial experience at once. Yet, going into factories at this time, as young men of military age, they necessarily must request draft deferment. They know that they must face growing questioning looks and glances as the war proceeds, and growing social criticism, both during and after the war.

Older engineers, in the majority, being already rooted in industry for years, feel for the most part that they are making their maximum contribution right where they are. Some engineers have been drafted, and are now doing work which less trained people could do. Again, some engineers are teaching, on a level such that many people with much less technical training, including women, could easily replace them. Thus far, not enough has been done to examine this problem, to determine definitely whether each engineer is now serving at the post where he is most needed. In passing, it might also be noted that the competition which has existed between sections of the armed forces for engineers, as well as the competition between the armed services and industry, is inefficient.

How should the problem be solved? In order to strengthen the nation's war effort, it is proposed here that every graduate engineer be commissioned in the Armed Forces. Steps in this direction should be initiated for student engineers in their senior year. Allocation of engineers between the various subdivisions of the Armed Forces, and between the Armed Forces and industry, should be made by a joint board which should include representatives of the armed services, the War Manpower Commission, and the professional engineering societies.

Since every engineer, under such a program, will be in uniform and under assignment, there should exist a greater tendency and possibility to put the right men in the right place. Because it will be immediately clear to all that every engineer will be assigned to the place where he is most needed, there will be no criticism of the engineer in industry. In addition, the inefficient competition which exists between the armed services themselves for engineers, as well as between the armed services and industry, will be greatly reduced. Flaws there will be, undoubtedly, but such a broad decision will be a step in the right direction—a step which will mean more efficient use of that critical commodity, the technically trained manpower of the nation.

GREATER COMFORT FOR THE FORGOTTEN MAN

By J. R. FELLOWS

Assistant Professor in Mechanical Engineering

Modern, thermostatically-controlled heating systems in which fuels of different types are fired by intricate mechanical devices, when properly designed, are capable of maintaining the temperature in all parts of the rooms they heat within one degree of the desired temperature. Until the production of all non-essential equipment was stopped by our country's entry into the present world conflict, these miraculous products of engineering skill and ingenuity were available in a number of competing types to any one who could spare the cash to cover the cost of an installation which graded upward from around $500.

Unfortunately the great majority of our citizens are caught in the lower and middle income brackets and cannot afford the luxury of automatic heat. This large group which has been referred to as the "forgotten man" has indeed been forgotten by the heating engineer. With few exceptions, the hand fired stoves of today are fundamentally identical with the stoves used during the childhood of those of us who were born "thirty years too soon."

Most householders who use hand fired furnaces of one type or another, use them instead of automatic heating systems because their income will not cover all the things desired by themselves and their families. They prefer to hold the cost of heating to a minimum so that they will have more to spend on food, clothing and entertainment. Since bituminous coal is the lowest priced fuel throughout the greater part of the country, it is the logical choice for the majority of householders who heat their homes with hand fired furnaces.

Though many of the younger generation have been privileged to live in comfortably heated homes since birth, there are few of mature age who have not at some time experienced the alternate "searing overheat" and the "uncomfortable chill" of the average home that is heated by a hand fired furnace burning "soft" coal. The above mentioned performance characteristics of the hand fired coal furnace, together with the frequent necessity for rekindling the fire and occasional explosions makes winter the dreaded season in the average home of the worker whose income is in one of the lower brackets.

A technical analysis of the process of burning bituminous coal in the conventional hand fired furnace soon discloses that furnaces of this type are not properly designed for this fuel. When a charge of coal is placed in a conventional furnace in the conventional manner as shown in Figure 1, either overheating or wasteful operation is inevitable. The coals from the previous charge soon heat the fresh coal, and the volatile matter which may contain nearly one-half of the entire heating value of the charge is converted to a gaseous state. If the overfire air ports in the firing door are adjusted to supply sufficient air for the combustion of the gases as they are released and the bed of coals is hot enough to produce flames, the greater part of the volatile matter is burned within thirty minutes after firing and the house becomes badly overheated. If the overfire air ports do not supply enough secondary air to burn the gases completely, the hydrocarbon molecules break up into hydrogen and carbon and the carbon issues from the chimney as a black smoke and settles as a mantle over roofs, walls, walks and porches. It is impractical to provide sufficient secondary air to completely burn all the gases liberated during the first half hour after firing because the damper adjustment required for this period would provide far too much air throughout the remainder of the cycle and this excess air would carry more heat out of the chimney than would be saved by burning the gases completely. If the coals on which the fresh fuel is placed are not hot enough to ignite some of the gases and cause a flame, the heat that would be liberated by the combustion of the gases is not released and the gases pass out of the chimney unburned to pollute the atmosphere of the neighborhood.

A study of the hand fired furnace which was made in the Mechanical Engineering Laboratory by Professor A. P. Kratz, Mr. J. C. Miles and the author with some suggestions by Professor P. E. Mohn has evolved a new design adapted to the burning of high volatile bituminous coal. A longitudinal vertical section of the furnace is shown in schematic form in Figure 2. The front portion of the furnace is used for the first stage of the combustion process, namely the coking of the coal in which the volatile

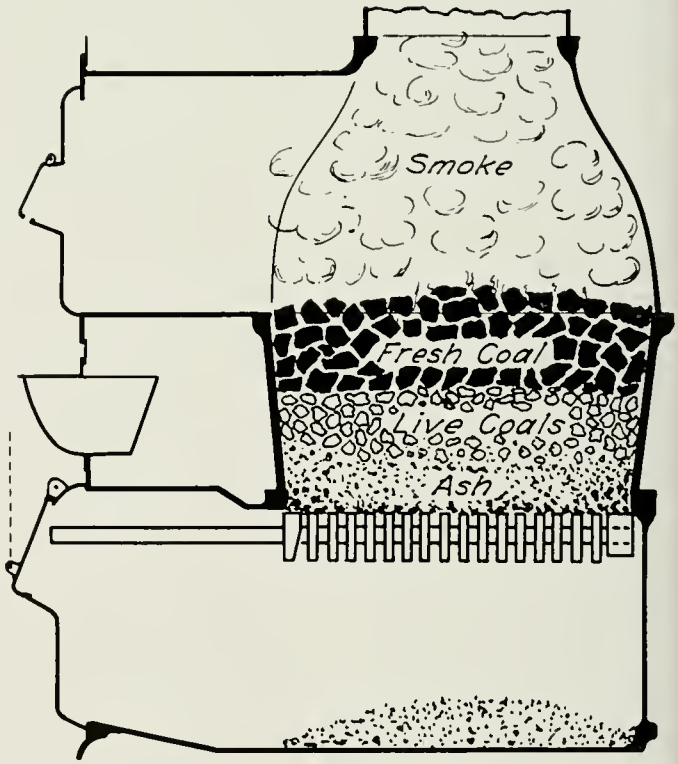


Figure 1. Sectional view showing the fuel bed of a conventional warm air furnace after placing a charge of fresh coal.

matter is gradually converted to the gaseous state by heating the charge from the edge. The rear portion of the furnace is provided with a conventional grate in the conventional position and is used for the second stage of the combustion process, namely the burning of the fixed carbon contained in the coke. The floor of the coking chamber is sloped

at an angle of approximately 45 degrees to make it easy for the householder to push the hot coals or coke from the previous charge into the coke burning chamber at the back of the furnace before placing a charge of fresh coal at the front. The door is also placed at an angle to make it easy to fill the coking chamber from a coal scuttle.

Figure 2 shows the furnace in a freshly charged condition with the coke burning chamber filled with coke and a charge of fresh coal in the coking chamber. Since only the edge of the charge is heated by the hot coals, the

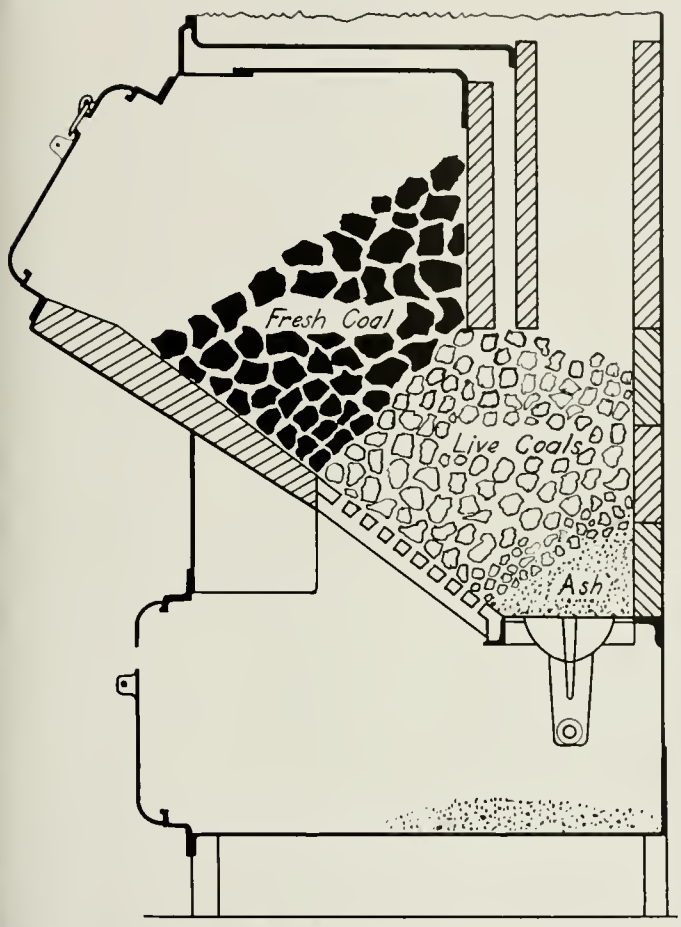


Figure 2. Sectional view showing the fuel bed of the new smokeless furnace after placing a charge of fresh coal.

volatile matter is not converted to the gaseous state as rapidly as in the conventional furnace. It has been found by experience that a period of from three to six hours is required for the complete coking of a charge of fresh coal instead of one-half hour as in the conventional furnace. Because there is no period in the cycle when the volatile matter is converted to gas at an excessive rate, it is possible to adjust the secondary air ports to supply sufficient secondary air for the complete combustion of the gases coming out of the fresh coal during the coking period without supplying an excessive amount during the rest of the cycle. The baffle wall at the rear edge of the coking chamber serves the double purpose of mixing the secondary air with the gases as they come out of the coal, and directing the mixture over the incandescent surface of the burning coke where the ignition of the mixture is accomplished. The hydrocarbon gases from the coal are completely burned to carbon dioxide and water vapor in the small combustion chamber directly above the coke burning chamber and the products of combustion are conducted through a two pass heat exchanger before being released to the chimney.

A crude experimental model was designed and tested with Franklin County, Illinois coal during the summer of 1939. The experimental furnace was later tested with eight different types of high volatile bituminous coal besides anthracite coal, coke, and wood during the winter of 1939 and '40. The tests clearly indicated the superiority of the design over the conventional updraft furnace for the burning of bituminous coal and an application for a patent was made on March 6, 1940. United States Patent Number 2,295,781 was granted to J. R. Fellows and J. C. Miles on September 15, 1942 and immediately assigned to the University of Illinois Foundation. The design principle covered by the Patent is applicable to all types of hand fired coal burning appliances such as stoves, furnaces, boilers and water heaters.

The Majestic Company of Huntington, Indiana, has agreed to pioneer a small furnace embodying the design principle covered by the patent and have been granted sole manufacturing rights for this one application of the principle in the States of Illinois, Indiana, Ohio and Michigan.

The engineers of the Majestic Company have collaborated with the aforementioned members of the University of Illinois Engineering Department in the design of a small unit suitable with slight modification of the casing for use as a forced circulation warm air furnace, a gravity circulated warm air furnace or a circulating heating stove. The University has purchased the first unit manufactured by the Majestic Company and it is now installed in the Mechanical Engineering Laboratory where it will be used for further tests and studies. Figure 3 shows the unit,

(Continued on Page 20)

Figure 3. Photograph of the first commercial unit which is installed in the mechanical engineering laboratory.

The Case for Welding

By WILLIAM G. MURPHY, C. E. '43

The War Production Board has ordered that every possible saving be made in steel construction for the duration. Thinking engineers realize that this saving must not be made at the cost of strength in the structure, nor is it practical to use temporary materials in buildings that are to be used permanently.

Representatives of each type of construction have presented their case to construction engineers. Welded construction gives a saving in steel and doesn't sacrifice any strength since it eliminates the ordinary connection pieces. In a riveted construction it is necessary to use a third member as a connector, while welding permits direct connection of the two members through a weld. In spite of the saving the welding of joints is not a war measure; it was developed to make a saving in fabrication and to overcome both shop and field difficulties of riveting joints.

A conservative designer immediately asks questions about the strength of this type of construction. He wants to know if the method is practical and safe.

Welding is definitely safe since there has been no major failure of this type of construction. It is practical now more than ever in construction work where previously rolled shapes have been discontinued and it is necessary to build the desired structural shape from those available. The various types of welds that can be used to make desired shapes are shown in Fig. 1. They are divided nito two general classifications according to the joint produced: butt welds where two plates are placed edge to edge or fillet welds where the plates overlap.

In order to maintain the safety of the construction skilled welders must be obtained. The ability of a welder can be determined by tests. Require them to weld plates together with a fillet weld and after the metal has cooled, break them apart . . . . "the weld metal should be bright, dense, even-textured, and crystalline or fibrous; and there should be good fusion of the weld and base metals, and good penetration into the right angle corner of the fillet."[1]

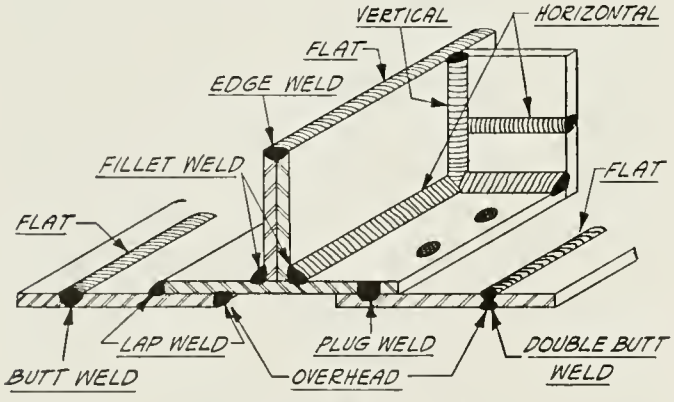


Figure 1. Types of Welds

Cut from *Procedure Handbook of Arc Welding Design and Practice, Courtesy Lincoln Electric Company*

Next require them to make two butt welds as shown in Fig. 2. These plates are cut into five two-inch strips and the reinforcement is ground off. These strips are tested in tension and must average about 45,000 lb. per sq. in. with no strips to test at 40,000 lb. per sq. in.

Finally the welders should be required to weld a specimen as shown in Fig. 2, using fillet welds. These are tested in shear and the average of the specimens tested should be 44,000 lb. per sq. in.

Inspectors on the job should be watchful enough to see that the welders are making good welds and working with the proper speed. Welded construction results in a saving of manpower also since one man can do the work in a moderate size building. "At the Edison 14-story building in Boston, four welders were used to field weld the 1,314 tons of steel in the building, of which 1,050 tons were

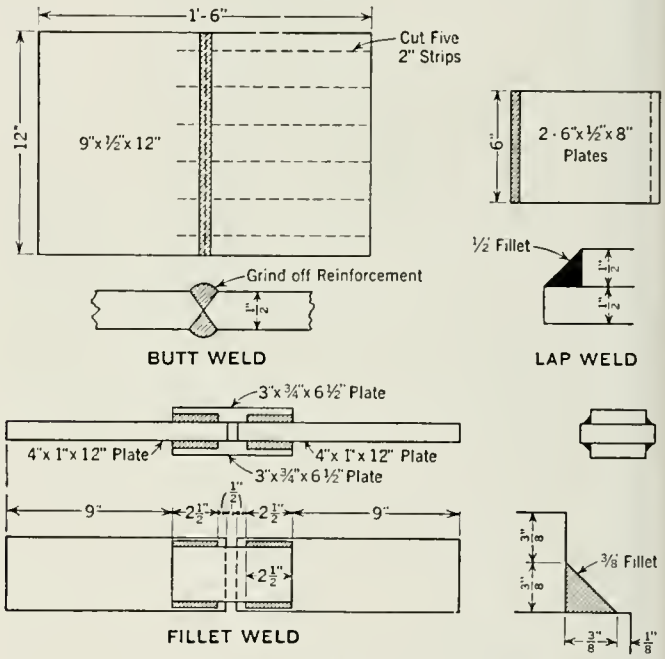


Figure 2. Test welds to qualify welders

Cut from McKibben, Frank P., Arc Welding on Steel Buildings," *Civil Engineering*, Oct., 1930

actually connected by welding, the remainder being largely foundation steel."[2]

Most building codes now have welding clauses or clauses which allow the city officials authority to accept plans for welded construction. Specifications allow a unit shearing strength of 11,300 lb. per sq. in.

Weld calculations use the theoretical throat dimension (see Fig. 3)to obtain the size of the weld. It is obvious that there is a certain margin of safety due to the difference between the theoretical and actual throats. For a 3/8 in. fillet weld the throat distance is 0.266 in. One inch of a 3/8-in. fillet can transmit $11{,}300 \times 0.266 = 3{,}000$ lbs. If the stress to be transmitted is 30,000 lbs., $30{,}000 \div 3{,}000$ is 10 in. If one of the members is an angle, the 10 inches may be divided according to the moments about the opposite fillet.

Using A and B as the lengths at the back and toe respectively, the lengths may be computed by $A = Px_1\ sd$

1. McKibben, Frank P., "Arc Welding on Steel Buildings." *Civil Engineering*, Oct., 1930
2. Ibid.

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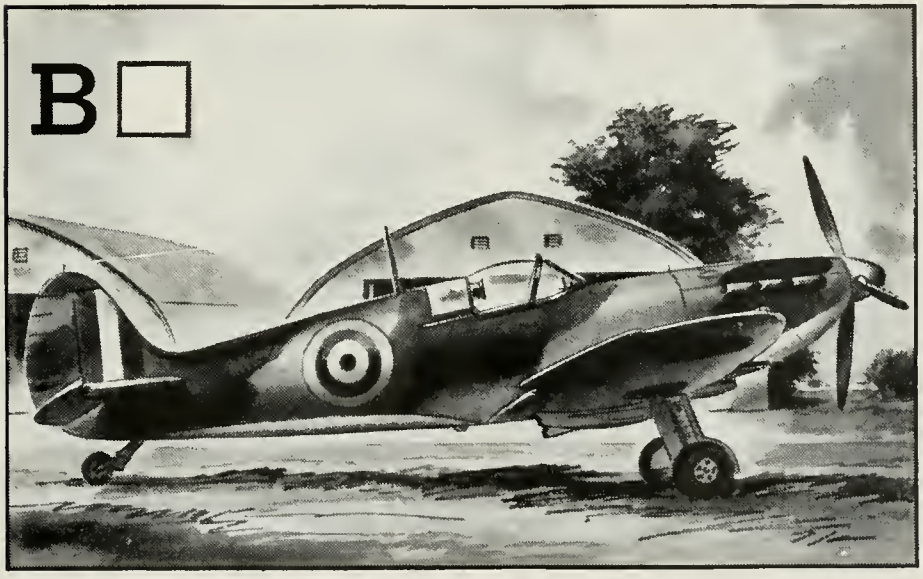


WHICH would you vote "most likely to succeed?"

"The Aircraft Warning System gives a single plane on ground alert the equivalent striking power of 16 planes on air patrol." This startling statement comes from England.

Our country's Aircraft Warning Service—quite similar to England's—keeps a constant check on the flight of all aircraft. Should the need arise, it is prepared to send fighter planes aloft, to mobilize and direct ground defense forces, to warn endangered areas. Every step in its operation requires the fast, accurate communication of the telephone.

This is just one of the many wartime jobs that are keeping telephone lines busier than ever before. To help us keep lines clear for vital military and industrial calls, please avoid using Long Distance to war activity centers unless the call is urgent. And please keep all your telephone calls as brief as you can. Thank you.

WAR CALLS COME FIRST!

BELL SYSTEM — AMERICAN TELEPHONE & TELEGRAPH CO. AND ASSOCIATED COMPANIES

NAMES *in the* NEWS

By WILLIAM R. SCHMITZ, Ch. E. '45
and
LEE A. SULLIVAN, M. E. '43

GEORGE MAYS

George Mays has accomplished something that few of the engineers here at Illinois ever do. He has already graduated once. He graduated from the University of Tulsa with honors in commerce. He worked for two years with the Carter Oil Company, before deciding that he would like to know something about the engineering side of the oil industry. Since Illinois had a very good name around his home town of Tulsa, Oklahoma, he came to Illinois to get his engineering degree.

A mechanical engineer, taking the petroleum option, George has done okay for himself. He has a neat 4.5 scholastic average. Better known as Elmore to some of his friends, George is a member of Tau Beta Pi, treasurer of A.S.M.E. and is president of Pi Tau Sigma. He is also proctor of his fraternity, Lambda Chi Alpha.

George says that he gets a lot of pleasure out of his work

GEORGE

with fraternities. He really enjoys the contact with the boys. On the sidelines, he likes to play a clarinet and to box. In the summer, he also does quite a bit of saleswork.

According to George, the biggest advantage of Illinois is that it has men of its faculty who have really accomplished something in their respective fields. George says that the chief goal of his life is to be happy, and to be successful in some phase of the oil industry.

HOMER PRATTE

Homer Pratte is one of the best chemical engineers here at Illinois. He is president of A.I.Ch.E., member of Sigma Tau, Coast Artillery Club, and is a 1st Lieutenant in the Coast Artillery of advanced ROTC. Homer has worked a lot with Boy Scouts and enjoys outdoor activities, especially camping.

Here on the campus, Homer hasn't done much dating. He prefers to make up for lost time when he goes home to East St. Louis, Illinois. He says that he had his best time last Homecoming when he had his girl up for the week end.

Homer has had to work quite a bit in order to get through school. At the present time he is working for Prof. Babbitt in the water sanitation department. The subjects

HOMER

that have particularly pleased him are German, organic chemistry, and chemical engineering research. In that, he is working on the evaluation of a laboratory fractionating column. Homer has done very well for himself since coming to Illinois as shown by his good 4.27 scholastic average.

Besides being quite a music enthusiast, Homer has a good tenor voice. He likes to listen to the radio, especially to semi-classical music and to musical operettas. When he graduates, Homer will join the army as a Lieutenant. He says that if he has to remain in the army for several years, he might make the service a career. Otherwise he wants to be a chemical engineer.

PAYSON SHONKWILER

Payson Shonkwiler, better known to all his friends as Shonky, came to Illinois after spending two years at McGill University, which is located in his home town of Montreal, Quebec, Canada. When asked why he happened to come to Illinois, he said, "Well, my dad went to Illinois and I wanted to take ceramic engineering, and since Illinois has

PAYSON

a good ceramic engineering school, I just naturally came to Illinois."

It seems that Payson spends a good portion of his extra time across the street at Presby Hall, where he is quite well acquainted with a certain young lady. He likes dancing and the parties given by the Y.M.C.A. and McKinley Foundation.

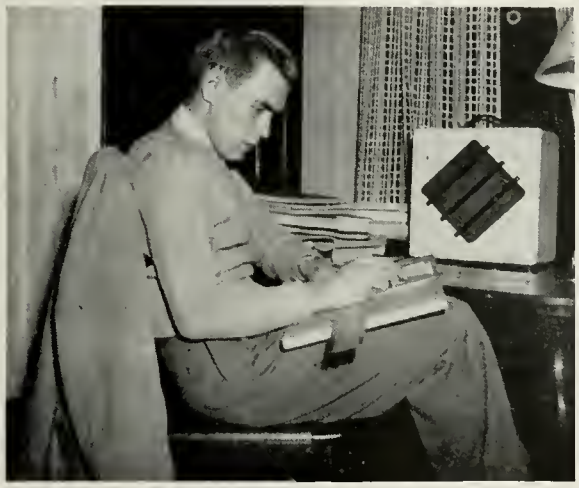
Payson is president of S.B.A.C.S., member of Keramos, Theater Guild, Pierrots, Sigma Chi, and a cabinet member of the Y.M.C.A. He plays the saxaphone and gets a kick out of working with the boys at the Y. Shonky has been making pottery as a hobby. He bas several nice looking lamps, ash trays and other articles in his room.

When he graduates, Payson plans to enter the Harbison Walker Refractory Company and work in the research laboratory. When querried what his life goal was, he replied, "I hope to be a happily married man making a comfortable living."

OTTO JOHNSON

Otto Johnson is an agricultural engineer. He is a member of Tau Beta Pi, Phi Eta Sigma, Agricultural Engineering Club, and is president of Sigma Tau. He is also one of those distinguished students who wears the scholarship key.

Hailing from Seneca, Illinois, Otto came to Illinois because he felt that Illinois had one of the best well-



OTTO

represented schools in the country, and is definitely superior in many engineering fields. Otto has especially liked his T.A.M. subjects, which have helped contribute to his good 4.45 scholastic average.

Otto is one of those lucky fellows who will graduate in February. He is in the Air Corps reserve and expects to be called to duty in March. Otto's favorite sports are bowling and tennis. He also has a coin collection in which he has a gold three cent piece.

According to Otto, the greatest thrill that he has experienced was when he pledged Tau Beta Pi. If there is anything that irks him, it is when some fellow edges in front of him when he is about ready to check his hat and coat and proceeds to check about a half dozen.

GUS SIMPSON

One of the best military men to come along at Illinois in recent years is Gus Simpson. Gus has made military his hobby and business ever since he was fifteen years old. At that time he enlisted in the National Guard in his home town Margate City, New Jersey. He served three years with the Field Artillery of the National Guard before

GUS

coming to Illinois. He says that one of the main reasons for coming to Illinois was because of its fine ROTC unit.

Gus is a Cadet Lieutenant in the Field Artillery and has a neat 5.0 average in military. He has won several medals and cups during his military career. Gus is not just a military man, but is also a metallurgical engineer. He is president of M.I.S., president of the Caisson Club, member of Military Council, and Blue Pencil.

The most important thing that has happened to him so far, Gus says, is the many swell people he has met out here. The people here are a lot nicer than those in the East. Gus also adds that this is the most democratic place he has ever been in.

Like a lot of other engineers, Gus likes to date and to go dancing. Gus believes that he would like to eventually get into some kind of work where he could tie up his metallurgical engineering with the army, probably in some ordnance plant.

VERNON RYDBECK

Vernon Rydbeck is chairman of the A.I.E.E. and recording secretary of Eta Kappa Nu. He is also in charge of the meals at his house, Pi Lambda Phi. Vernon is one of these fellows who have a big smile for whomever they happen to meet.

Among the favorite sports of Vernon are tennis, ping pong, basket-ball, and ice skating. He used to be quite a stamp collector, but has sort of let his collection slip

(Continued on Page 15)

VERNON

Plywood Has Many War Uses

Weight for weight, plywood is stronger than steel and is now used in airplanes, barracks, boats, houses and hangars, Dr. Nelson C. Brown of the New York State College of Forestry, Syracuse, declared in a General Electric Science Forum address.

Today most plywood is made of three or five cross-bands of veneers—thin sheets of wood placed in crosswise directions, layer by layer, Dr. Brown said.

"Plywood is plentifully available," he continued. "Because it has so many uses and lends itself to such a variety of architectural and construction designs, more than a billion feet of plywood are manufactured and used each year.

"The development of water-resistant and heat-resistant glues have revolutionized its use. With the addition of those new glues, plywood can even be immersed for hours in water, or subjected to exceeding high temperatures without changing its size, strength, or shape."

Speaking of its tractability, plywood can be curved, bent, and shaped in many plasticized forms; for instance, in airplanes, according to Dr. Brown.

"It has been widely used in both training and bomber types," he explained. "In fact, one of the most successful British bombers has regularly been made of birch plywood.

"Its lightness in weight and its great strength make plywood ideal for plane construction.

"And many forms of boats are now being made of plywood since the development of those water-resistant glues. It suggests a tremendous utilization, because so many small boats can be quickly assembled from plywood."

Dr. Brown mentioned that the ancient Greeks and Romans used veneer. And until about 1880, veneers were made principally from beautifully grained and handsomely figured woods. They were in great demand for table tops and fine furniture because they added a superior color, grain and beauty to what otherwise would have been rather ordinary-looking furniture.

Today no special kind of wood is necessary for making thin sheets of veneer, the speaker said.

"Almost any kind of wood can be used," he pointed out. "Originally, walnut, mahogany, rosewood, and other cabinet species were very much in demand. Now, because of the large size of logs available and the straightness of the stems, great quantities of Douglas fir are used."

In producing large, unbroken sheets of veneer, the log is placed in a huge lathe and turned against a sharp knife. In this way, continuous sheets of veneers are peeled off the log, until the log, originally from 30 to perhaps 50 inches in diameter, is reduced ultimately to about 8 to 10 inches in diameter.

Among the hardwoods, birch, maple, beech, red gum, walnut, and yellow poplar are used besides Douglas fir to make plywood. And among the softwoods, southern pine, Sitka spruce, ponderosa pine, northern white pine, and western hemlock are commonly used.

Laminated wood should not be confused with plywood, Dr. Brown declared.

"Laminated wood is another form of compressed veneer," he said. "The various piles are laid lengthwise

NAMES IN THE NEWS

(Continued from Page 13)

since coming to Illinois. His main hobby is sketching and drawing cartoons.

At the present time, Vernon's plans call for him to begin work with General Electric after his graduation in June. He expects to test turbine generators at Schenectady, New York. He eventually hopes to go into sales engineering work.

Vernon lives in Chicago and spent his freshman year at Armour. Then he transferred to Illinois. He said that one of the biggest reasons that he came to Illinois was because of the college atmosphere here. He says that his dating and social life is about par for the engineers, but he doesn't think too much of the average co-ed.

GREATEST BATTLESHIP

Greatest man-of-war ever to be launched is the U.S.S. Iowa, 45,000-ton battleship which went down the ways at one of the Navy yards recently. She will be driven by General Electric geared-turbine propulsion equipment.

This vessel, first of six of the same class, was completed seven months ahead of schedule through the united efforts of thousands of engineers and workmen. Her five sister ships, the New Jersey, Missouri, Wisconsin, Illinois, and Kentucky, are being built at various yards throughout the country.

Some statistics: The plan-design work required 429,000 man-days, and the construction work, 4,100,000 man-days. Blueprint paper used for the issuing of plans totaled 175 tons. Area of all decks and platforms: 418,000 square feet. Some 800 miles of welding was used in construction. The ship has 1,074 feet of shafting to drive her, 80 miles of piping, 16 miles of ventilating ducts, 15 miles of manila and wire rope, 250 miles of electric cable, 900 motors, 5,300 lighting fixtures, 275 service and 816 battle telephones. It took 200 tons of paint to paint her.

instead of crosswise. It is used in the manufacture of gun stocks and airplane propellers.

"Gun stocks look as though they are made from solid wood, and for a long time it was thought that only certain woods could be used for gun stocks. However, several years ago in Europe it was discovered that cheap beech could be used. With the aid of some phenolresin glues, it was found a gun stock of beech could be made that was far superior to one of solid wood.

"In laminated-wood propellers, large-sized laminated forms are made by gluing thin sheets of wood together and then the final product is turned out on a lathe."

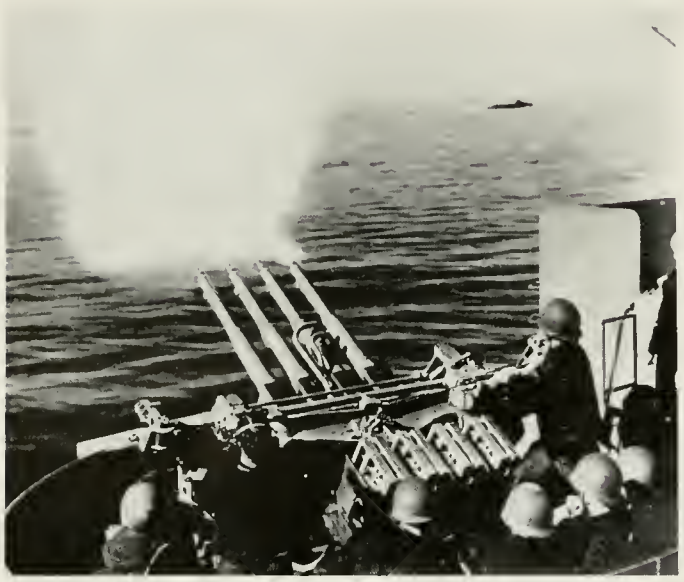
The huge consumption of logs for veneers has increased five times in less than 40 years, for in 1905 only 181 million board feet were used annually, according to Dr. Brown.

He said this wood becomes an enormous amount of veneer when you consider that the thickness to which the wood is cut into veneers may vary from as thin as 1-100 up to 1-2 inch. Actually, for commercial purposes, the wood is generally cut between 1-40 up to 5-16 of an inch.

"The stimulus of war has brought about modifications and revolutionary methods of both manufacture and application," Dr. Brown concluded. "Plywood has been caught up and swept along to new and greater usefulness.

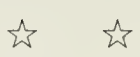
"The hand of the forester, the hand of the woodworker, the hand of the scientist—are all apparent in the plywood of today. Its future is too promising to be neglected by the builders of tomorrow."

GUN MOUNTS *for* NAVY



—(Official U. S. Navy Photo) (Courtesy Westinghouse)

ACK-ACK IN ACTION—This official U. S. Navy photo shows the 1.1 inch multiple anti-aircraft gun, now in service on every type of American fighting ship in action. This rapid-fire unit, firing hundreds of shells a minute at Japanese planes, played a significant role in the battles of Pearl Harbor, the Coral Sea and the Solomon Islands. The British affectionately call this gun "The Chicago Piano," according to Navy reports.



Record-breaking production of the new American 1.1 multiple gun mounts carrying four rapid-fire anti-aircraft guns—the weapons which hurled hundreds of shells a minute at Japanese planes in the battles of Pearl Harbor, Midway, and the Solomon islands—has been made possibly by large-scale manufacture at the Westinghouse Electric Elevator company, Jersey City, N. J. The new gun units are now on active duty on every type of American warship.

Before Westinghouse tackled the job in the summer of 1940, each gun mount required 8,500 man-hours of labor and cost about $27,000, but assembly-line production methods enabled the company to turn out each unit with about 2,100 man-hours of work at a cost of about $12,000. These 1.1 guns have been produced by Westinghouse at a saving to the Navy of more than 10 million dollars in cost and 4,400,000 man-hours of work. Differences between estimated cost and actual cost were returned to the government. By May, 1942, the company was turning out nearly 40 per cent more mounts each month than its contract called for.

Weighing 14,000 pounds, each mount consists of an adjustable four-foot long horizontal gun support, installed in an H-shaped stand which is moored to a revolving steel base. Each gun support has four large grooves, nine by 13 inches, into which water-cooled gun barrels are inserted. The four guns, although not synchronized, are fired in nearly simultaneous bursts by a single trigger mechanism on the left side of the unit.

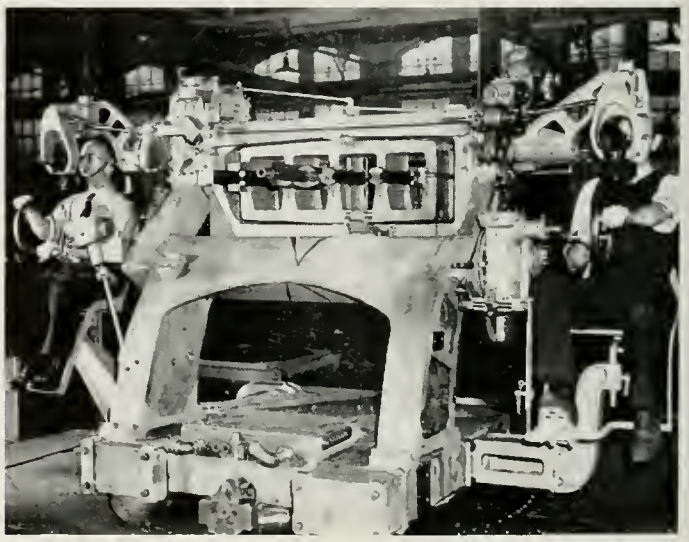
Guided by sights on both sides of the unit, Navy gunners train the guns on flying targets by moving them quickly up or down and left to right. When necessary the entire mount can be swung in a complete circle. The guns are aimed manually by a series of easy-turning cranks near the sights, and also by hydraulic power controls which are installed when the gun units reach a ship. Maneuverability of the mounts depends upon precision manufacturing at extremely close tolerances. This is insured by 4,800 inspections during the manufacturing process, or about six inspections for each of the unit's 800 principal parts.

Principal surfaces must be levelled to a "dead flat" point with an allowable discrepancy of two-tenths of a thousandth of an inch. Other parts must be accurate within four-tenths of a thousandth to a thousandth of an inch. Accuracies required for the units' flat surfaces are too delicate to be achieved by machines, so the required precision is obtained by hand scraping.

Just before the gun mounts are ready for shipment, sights that are used in actual combat are installed temporarily and tested for accurate alignment with gun barrels. Maximum allowable tolerance in this test is one minute, or one sixtieth of one degree—which would result in a deviation by the gun projectiles of not more than ten and one-half inches per thousand yards.

To obtain the necessary manpower to handle this job, men were drilled in fundamentals of machine operation for six to eight weeks. They were taught to operate lathes, screw machines, boring mills, grinding and milling machines, and also received instruction in blueprint reading, measuring instruments, shop mathematics, machine technology, and shop safety. Upon completion of the course, additional instruction was given at night, to supplement work in the factory. Experienced employes were promoted to more difficult jobs and apprentices trained to fill their posts.

Tools for production of the gun units were built by Westinghouse because regular tool manufacturers were overloaded with orders. Some 2,000 special tools, jigs, and fixtures were turned out at a cost of $500,000.



—(Courtesy Westinghouse)

GUN MOUNT TOES MARK—Mount for Navy 1.1 inch anti-aircraft guns is tested for microscopic accuracies. Inspectors are testing gun sights for alignment with grooves where gun barrels will be inserted. Westinghouse cut cost of each unit from $27,000 to $12,000 and work on each from 8500 man hours to 2100.

PLASTIC LICENSE PLATES

Faced with the problem of obtaining a priority for steel for the 1943 motor truck license tabs which must be added to all plates by the first of the year, Wallace G. Kittredge, director of the Commercial Vehicle division of the Commonwealth of Massachusetts, appealed to General Electric for a substitute material with the result that this year's plates will be made of a lightweight laminated plastic. This change not only will save 16,000 pounds of steel, so vital for war production, but will reduce the postage bill three quarters for mailing the tabs.

The tab is manufactured by General Electric of a laminated phenolic compound utilizing the printed and molded process. This consists of placing printed sheets bearing the required design on resin-impregnated sheets of paper, and the whole bonded together under approximately 250 degrees Fahrenheit temperature and 1500 pounds pressure. The pressing operation, which finishes the product in one operation and requires only minutes, converts the resin-impregnated sheets and the printed matter into a homogeneous and strong product having excellent weather resistance. No additional surface treatment is required and after sawing and drilling, the tabs are ready for the fastening to the 1942 plates.

ENGINEERING NEWS BRIEFS

To determine the particle size of pulverized metals, a requisite in the growing field of powder metallurgy, an instrument which shortens from eight hours to fifteen minutes the time consumed in this measurement has been devised by the Westinghouse Research Laboratories.

The former method of using the settling time of the finely-ground metal in a suitable liquid is the basis of the new procedure. Instead of allowing sufficient time for the metal to sink completely, or to a degree affording accurate visual evaluation, the progress of clarification in the supernatant vehicle, usually acetone, is closely recorded at intervals by a photo-electric cell receiving a beam of light being transmitted through the column under investigation. From the rate of change in the degree of capacity is calculated the dispersion of the metal bits.

Not only does this arrangement give a picture of the total effect set up by the interference of the metal to light transmission, but it also gives a selective indication regarding the proportion of different sized particles.

* * * * *

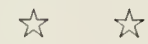
Taming the arc blow that plagues many a neophyte electric welder is now accomplished by use of an oversized version of the familiar horseshoe magnet.

The arc between the electrode and the metal being welded is subject to interference from incidental or stray magnetic forces coming from the current itself that sets up the arc, or from "permanent" magnetism in the metal objects under fabrication. This handicap is demonstrated through wavering or even more lasting deflection of the arc, and sometimes through the arc's being most annoyingly extinguished altogether.

Use of the elongated double bar magnet to straddle the seam smothers or diverts the wandering magnetic forces and promotes faster and smoother fusing. In case of working at or near the end of a section, a single steel bar is quite efficient, say Westinghouse welding authorities.

Our Societies . . .

By BYRON M. ROBINSON, M. E. '44



CHI EPSILON

On Dec. 13, 1942, a regular meeting of Chi Epsilon was held at Triangle Fraternity. An interesting discussion, illustrated with slides, was given by Professor Jamison Vawter on "Bombs and Bomb Protection." The meeting was then adjourned for refreshments.

The first business meeting of the year in which the new members were active was held Dec. 18, in the Union Building. At that time, the keys were passed out, and Erasmo Mendez and Carl Mueller were appointed as a committee to arrange for meetings.

Officers of Chi Epsilon for the second semester 1942-43 are as follows:

Ray Ackerman .....*President*
Homer Wong .....*Vice-President*
Carl Mueller .....*Secretary*
Bob Mosher .....*Treasurer*
Harold Schwellensattl .....*Editor of Transit*

A. S. C. E.

The A.S.C.E. held a meeting on December 3, 1942. Professor G. W. Pickels told of the opportunities in the Society, and urged all seniors to join the parent chapter after graduation.

A sound movie entitled "Along the Blue Ridge Parkway" was shown. The picture was in technicolor, and many beautiful views along the scenic highway were shown. They were of particular interest to the engineer as he realized the difficulties which must have been encountered in constructing such a highway "along the skyline."

Mr. W. H. Wisely, superintendent of the Champaign-Urbana Sewerage District, spoke to the C. E.'s on January 7. He told of some of his amusing and educational experiences in his fifteen years as a Sanitary Engineer.

A. S. A. E.

On December 8, 1942, the Ag. Engr's heard Professor G. W. Pickels speak on "Patents and Patent Law." At their last meeting on January 12, two color films on the Furgeson system of farming were shown. The officers for next semester were also elected. The are as follows:

Bob Whitaker .....*President*
Arthur Radke .....*Vice-President*
Gilbert North .....*Secretary-Treasurer*
Donald Hamer .....*Scribe*

A. S. M. E.

The A.S.M.E. held its last meeting of the semester on Wednesday, January 20. The names of the candidates for offices in A.S.M.E. for the next semester were announced. An instructive film on Diesel engines was shown.

TAU NU TAU

At the last meeting of the semester on Friday, January 15, the following T.N.T. officers were elected for the second semester 1942-43:

Dale V. Addis .....President
Ralph L. Lippincott .....*Vice-President*
Jerry S. Dobrovolny .....*Secretary*
Stanley Staniszewski .....*Treasurer*

TAU BETA PI

Tau Beta Pi held its last meeting of the semester Tuesday evening, January 12 in the Illini Union building. The purpose of the meeting was to elect officers for the coming semester. The officers of recording secretary and treasurer hold over from the first semester. The officers for the second semester are:

Byron Welsh .....*President*
Dan Bechly .....*Vice-President*
Homer Wong .....*Corresponding Secretary*
Robert Kallal .....*Recording Secretary*
George Asselin .....*Treasurer*
Leonard Erickson .....*Master of Initiation*

S. B. A. C. S.

The Student Branch is writing a two-page news-letter to the ceramists and ceramic engineers who have graduated within the past three years. Other ceramic graduates will also receive this news-letter if they have maintained even a little contact with the Ceramic Department. This news-letter contains news of the Ceramic Department for the past semester, and should be very interesting to all ceramists from Illinois.

KERAMOS

Keramos held a banquet for its seniors and its new initiates on January 20 in the Colonial Room of the Illini Union. After the banquet, the ceramists moved to the faculty lounge for their meeting. Keramos plaques were presented to the graduating seniors.

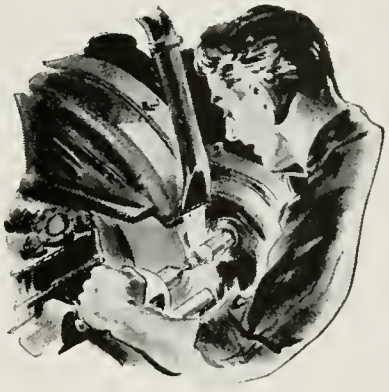
PI TAU SIGMA

Pi Tau Sigma held it's last meeting of the semester in Kamerer's Annex on January 21. The meeting was purely social, with the members furnishing the entertainment. The turnout was very good since it was the last meeting for some of the graduating members. President George Mays predicts next semester to be as full as the last one.

Now they fly ten times as long without overhauling!

The flimsy crates of World War 1 needed overhauling after as little as 24 flying hours. But today's planes fly hundreds of hours at much higher speeds before a major overhaul. The reason? New materials, new designs and new methods of finishing metal surfaces. Finishes so nearly perfect that bearings, cylinders, pistons and cams are made practically wear-proof! It's a process in which Carborundum has played an important part...by supplying the finishing wheels and stones required.

Formerly ultra-finishing was a long tedious task. But thanks to the new process, finishes accurate to a few millionths of an inch can now be produced on ground surfaces on a production basis. Application of these finishes to wartime engine production has improved the fighting efficiency not only of planes, but of tanks and other motorized equipment. Fewer men are needed for maintenance and repair.



Ultra-finishing—is only one of many ways in which Carborundum may be able to help save precious time. When you get out in the field and encounter a production problem that abrasives might solve, write The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM
REG. U.S. PAT. OFF.
ABRASIVE PRODUCTS

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company

Greater Comfort for the Forgotten Man

(Continued from Page 9)

set up for test as a circulating heating stove. The duct shown at the right which is connected to a fan not shown, will be used later in testing the unit as a forced circulation warm air furnace.

While hand-fired furnaces, boilers, and stoves embodying the principle of the new furnace will not provide the forgotten man with automatically controlled, constant room temperature, it will enable him to control the fire, avoid overheating and maintain much more uniform house temperatures than is now possible with conventional furnaces. Though he will not be able to forget the heating plant till the "end of the month," it will be possible for him to "get by" with tending the furnace but once a day in spring and fall when the demand for heat is very light. If he buys a furnace, boiler, or stove of the new type that is properly proportioned to the size of his home, it will not be necessary for him to fire it more than two times each day except in extremely cold weather. When he opens the furnace firing door to prepare the fuel bed to receive a charge of fresh coal, the coals from the previous charge will rapidly become hotter instead of rapidly cooling as they do in the conventional furnace. Because the coals become very hot while they are being pushed back into the coke burning chamber, they are in condition to ignite the gases from the fresh coal when it is added. Because the hot coals are not covered with the green coal, the radiant heat from them is not cut off from the heating surface of the furnace and this heat from the coals plus the heat liberated by the combustion of the gases causes the furnace to deliver heat to the house at a very much accelerated rate immediately after the coals are pushed back and fresh fuel is added; whereas the heat output from a conventional furnace decreases when fresh fuel is added until the fresh charge has been heated through by the hot coals buried underneath. The furnace is designed to meet all of the requirements for smokeless combustion of soft coal by supplying sufficient secondary air, mixing the air with the coal gases and passing the mixture over the surface of the incandescent coke bed at the rear. Some smoke is produced if the fire is allowed to burn too low before fresh fuel is added but the inclined grate is arranged ahead of the horizontal shaking grate in such a way that ash may be accumulated at the back of the coke burning chamber in mild weather to reduce the effective grate area and make a possible to maintain the same depth of coke bed and the same rate of burning near the front edge of the baffle wall with a smaller quantity of hot coals. While some smoke will be produced in neighborhoods where most of the heating plants are hand fired with soft coal; even after all of the present equipment has been replaced by improved types; the amount of smoke and soot will be reduced at least 90 per cent and the forgotten man and his family will have cleaner air to breath and his wife will have much less dirt to fight. With less smoke and dirt in the atmosphere the forgotten man will receive more sunlight, and he will be encouraged to take a greater interest in the appearance of his property and a more optimistic view of life in general.

THE CASE FOR WELDING

(Continued from Page 10)

and $B = Px_2/sd$ where P equals 30,000 lbs., s equals 3,000 lbs., d is the depth of the angle or other unsymmetrical section, and x_1 and x_2 are the distances from the back and toe to the neutral axis respectively.

It will be obvious on further study that welding will result in a saving of steel, quieter construction, fewer men to do the work, and the ability to cope with the present problem of unobtainable shapes. Let us hope that as far as the structural engineer is concerned arc welding will win the war.

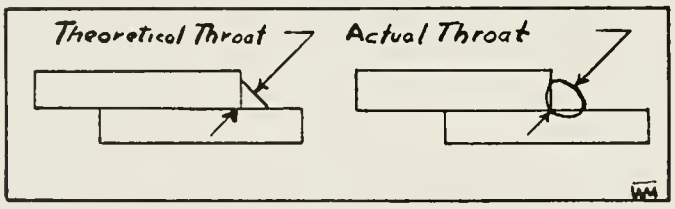


Figure 3. Throat of Fillet Weld

Cut from *Procedure Handbook of Arc Welding Design and Practice*, Courtesy Lincoln Electric Company

BLACKOUT AID

Us of phosphorescent paint as finish for the walls of "blackout" rooms, such as designated shelter sections in plants, gathering places, and especially institutions where movement is necessary during black-out periods, is receiving much attention following research by the Westinghouse Company showing that such finishes, activated by previous exposure to light, sheds sufficient illumination to permit persons of normal vision to move about safely and confidently. As a logical consequence, dyes are now offered which impart the same illuminescence to clothing, extending a pronounced safety factor for air raid wardens and other persons having duties during emergency periods.

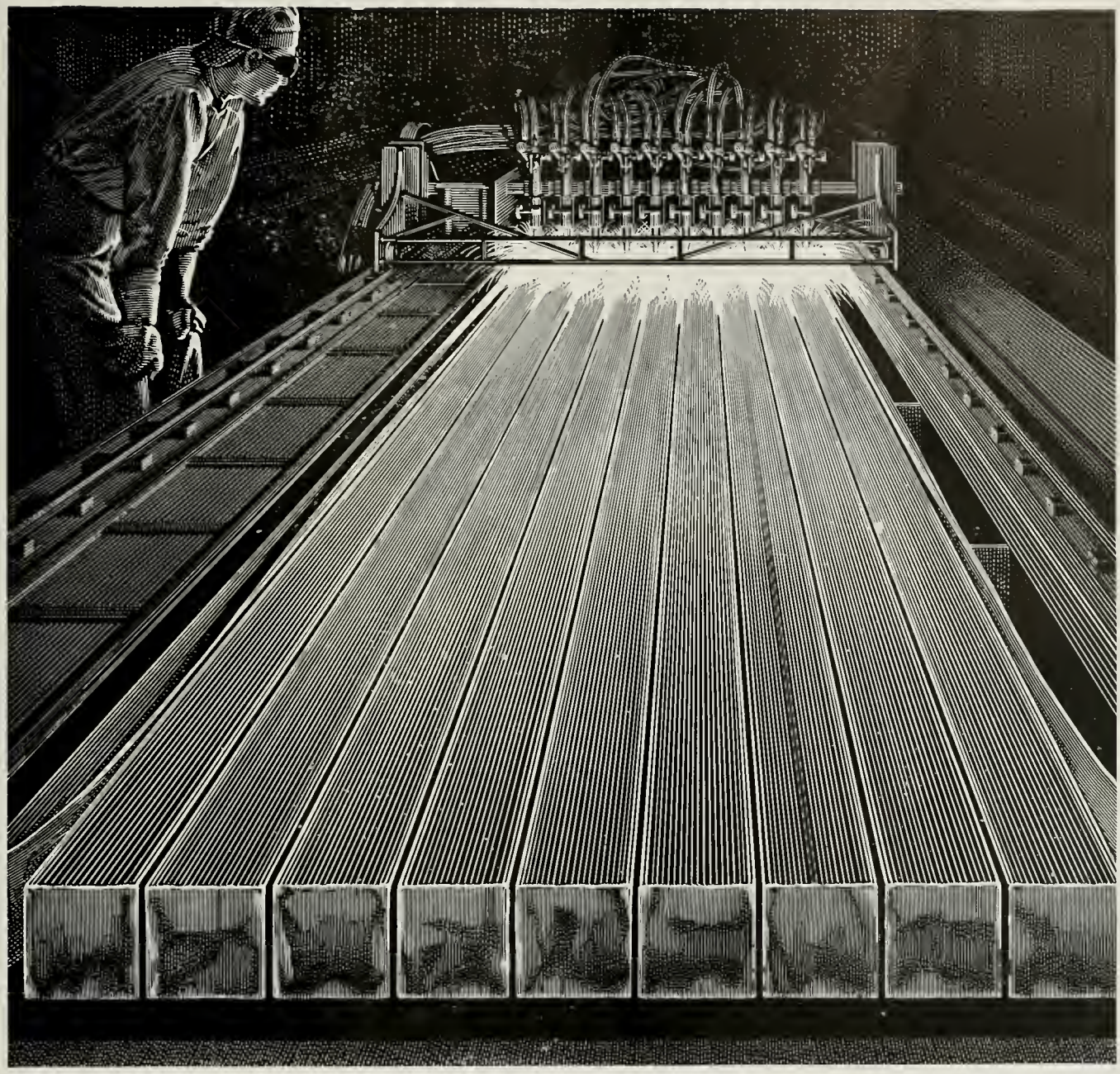
PHOTOTUBE GUARDS AGAINST ACCIDENTS IN COAL PREPARATION PLANT

Loaded coal cars are emptied at the New Piney Fork preparation plant of the Hanna Coal Company, Ohio, by being rolled onto a rotary dump, fastened to the rails by a mechanical device, and then rolled upside down over a chute. After the car has been righted again, it moves off the dump by gravity.

It is essential that the dump does not revolve the next full car until the preceding empty one has moved off. Otherwise, the empty car will be turned over onto the floor.

At intervals, however, the plant experienced difficulty with this arrangement. The dump would revolve before the empty car had cleared. This usually happened because a particular car took too long to move off.

This difficulty was remedied when a General Electric photo-electric relay and light source were installed on opposite sides of the track at the "empty" end of the dump. Now the dump cannot revolve as long as the light beam between the light source and the phototube in the photo-electric relay is blacked out by the body of the empty car.



SLICING STEEL SLABS — and production schedules

STEEL billets were needed. Only slabs were available. That was the problem presented by expanded wartime demands which had to be licked, quickly. It was — by the process illustrated above. Ten oxyacetylene cutting torches, mounted on a frame propelled by two Airco Radiagraph machines, streak down the 140" steel slabs and slice them into billets.

It's one of the many examples of how American resourcefulness, teamed with specialized knowledge, is making minutes more productive. Oxyacetylene cutting and welding and the electric arc are blazing new trails to faster and better production in almost every war industry. The minutes, hours, even days of production being gained by these modern tools are now helping us to overcome our enemies' headstart.

If you work with metals you should know the complete story of the oxyacetylene flame and the electric arc—their speed, efficiency and broad range of usefulness in metal working. This knowledge is vital today—invaluable in the peace to come.

"Airco in the News" shows many interesting uses of the oxyacetylene flame and electric arc. Write for copy.

AIR REDUCTION

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Magnolia-Airco Gas Products Co.
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ANYTHING AND EVERYTHING FOR GAS WELDING OR CUTTING AND ARC WELDING

TECHNOCRACKED . . .

By PAUL SALERNO, M. E. '43

A recent issue of the Alumni News carried a photograph of the new Abbott Power Plant. The caption said, "The new power plant is as efficient as electrical engineering skill can make it." The editor is lucky that few mechanical engineers read his paper. Or does he think we can't read?

* * * * *

A draftee, commenting upon the speed with which he was inducted into the Army, said, "They take your temperature. If you're warm, you're in. If you're cold, they bury you."

* * * * *

A colored Yankee soldier in England was engaged in a poker game with some British Tommies. He picked up his hand and saw that he held four aces. Anxiously awaiting his turn to bet, he heard someone say, "I'll bet one pound." When the colored boy's turn came, he said, "Ah don't know how yo' all count yo' money, but Ah'll raise one ton."

* * * * *

Prof.: "Name two pronouns."
Stude: "Who, me?"

* * * *

The Ford is my auto, I shall not want (another);
It maketh me to lie down beneath it;
It soreth my soul.
It leadeth me into the paths of ridicule
For its name's sake.
Yea, though I ride through the valleys,
I am towed up the hills.
I fear much evil; my rods and my pistons discomfort me.
I annoint my tires with patches;
My radiator runneth over;
I repair my blowouts in the presence of mine enemies.
Surely, if this thing follows me all the days of my life,
I shall dwell in the bug-house forever.

* * * *

Little Jim: "Are you a *trained* nurse?"
Nurse: "Yes."
L. J.: "Well, let's see some of your tricks."

* * * *

Engineers are often baffled by the fact that some of the girls with streamlined figures offer the most resistance.

PRAISE THE LORD
AND PASS THE AMMUNITION

Enlisted reservist's version:
Praise the Lord and pass me my commission.
Restaurant diner's version:
Praise the Lord and pass the malnutrition.
Senior mechanical engineer's version:
Praise the Lord and pass me my petition.

* * * * *

Officers of the British intelligence conducted a quiz program with some newly arrived American soldiers. "Ask as many questions as you wish about England and we'll try to answer them," they said.

They were stumped on the first question which was, "What is the age of consent here?"

* * * * *

First Little Pig: "My, my, I never sausage heat."
Second Little Pig: "Me neither. I'm nearly bacon."

* * * *

NOMENCLATTER

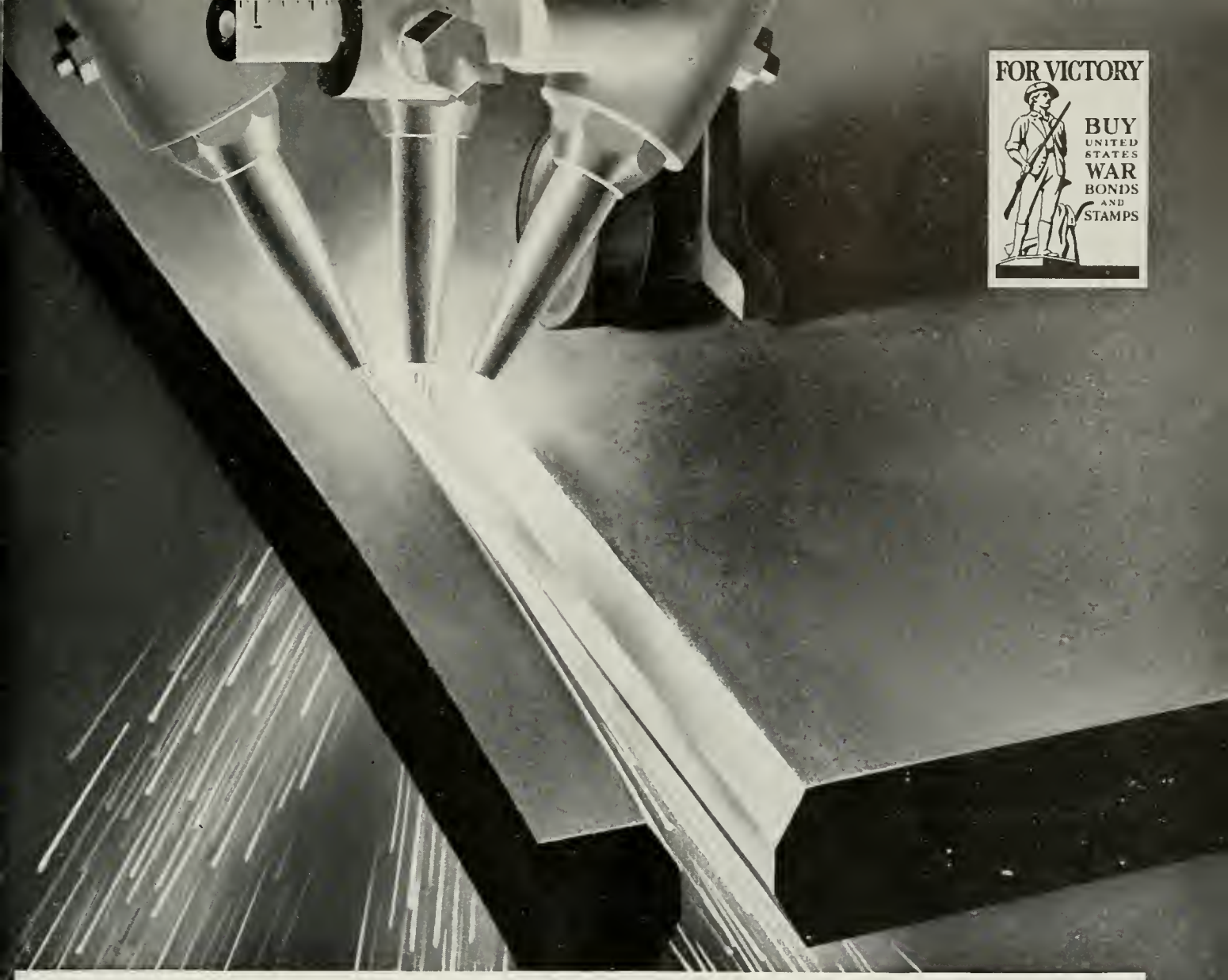
Silence—The college yell of the school of experience.
Hysteresis—Mental disease suffered by engineers.
Entropy—Side door in a speakeasy.
Stress—Musician who wrote the "Blue Danube."

* * * *

"So I told the freshman to indorse the check his family had sent him."

"Did he do it?"

"Yes, he wrote on the back: 'I heartily indorse this check.'"



FLAMES THAT CUT TIME!

TODAY, ships are needed as never before. And today, ships are being built as never before . . . and built faster, stronger, and with less steel . . . thanks to welding!

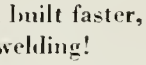
But before welding can take place, steel plates have to have their edges beveled and squared-up so that, when butted together, they look like this:  or like this: 

In the past, preparing plates in this manner was done by heavy machine tools. Cutting was slow and costly. Each plate had to be handled many times. Plate cutting on this basis could hardly keep pace with welding today.

Now, oxy-acetylene flames . . . *cutting in different planes simultaneously* . . . prepare the edges of steel plates of any commercial thickness *at one pass* . . . in a fraction of the time required by mechanical methods!

This Linde flame-planing method is as simple as ABC. It is economical . . . and easy to use. It cuts plates so smoothly and accurately that *no machining is necessary!* And it uses materials which can be produced in abundance.

On-the-job power requirements for flame-shaping are negligible . . . for the reaction of the cutting oxygen jet with the hot steel does all the work . . . and only fractional horsepower is required to move the cutting nozzles along the line of cut.

In conjunction with "Unionmelt" Welding . . . an amazing electrical welding process that unites plates of any commercial thickness faster than any similarly applicable method . . . like this  . . . the Linde method of plate-edge preparation is working miracles in speeding up shipbuilding.

These two methods are also helping to break production records in other fields. Great pressure vessels . . . locomotive boilers . . . huge pipes . . . heavy chemical tanks . . . combat tanks . . . artillery mounts . . . and other vital equipment are being turned out faster because of them.

Linde research, intensified today, is constantly solving new problems in flame-cutting, flame-fabricating, and flame-conditioning of metals for war production.

The important developments in flame-cutting—and other processes and methods used in the production, fabrication and treating of metals—which have been made by The Linde Air Products Company were facilitated by collaboration with Union Carbide and Carbon Research Laboratories, Inc., and by the metallurgical experience of Electro Metallurgical Company and Haynes Stellite Company—all Units of Union Carbide and Carbon Corporation.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

General Offices: New York, N. Y. Offices in Principal Cities

G-E Campus News

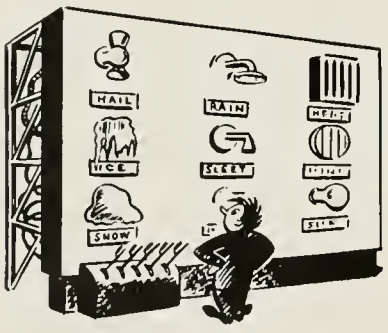
COAST IS CLEAR

FOR three years an automatic traffic control (essentially an electronic device) has been directing motorists through a one-way tunnel that serves as a direct route through a mountain on a Salt Lake County highway in Utah.

The traffic control counts vehicles as they enter and leave the tunnel. If the outgoing count is less than the ingoing, a bell warns a patrolman to go in after the missing car. Thus traffic is kept moving through the tunnel in one direction at a time.

When the carbon-monoxide content of the air in the tunnel reaches a critical point, another electronic watchman stops traffic and turns on a ventilating fan.

Approximately 600 cars go through the tunnel every 24 hours, but the electronic cop isn't tired yet.



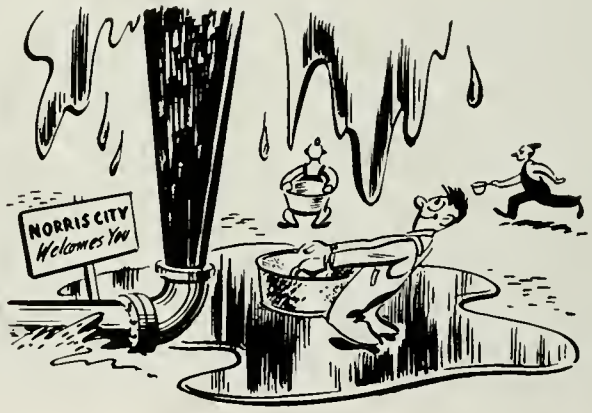
TAKE YOUR CHOICE

THE U.S. Army Air Force can test airplane engines at altitudes of 40,000 feet, where it's 67 below, or at low altitudes over deserts where the temperature soars to 120 F. without taking the ships from the ground.

Testing is done in a laboratory where refrigeration equipment, electric heaters, and air evacuating equipment take over for the elements.

One such lab, for which G.E. is building electrical equipment, will house several test chambers, in each of which engines will be tested under different conditions.

To accomplish this, air will be partly conditioned and then delivered to the various test chambers. At each test chamber the air will be further conditioned to obtain the exact humidity, temperature, and pressure for the particular condition desired. Then the air will be delivered to the engine carburetors.



PIPE DREAM

THE War Emergency Pipeline, largest oil trunk of its kind in the world, will go into operation in January. Extending 531 miles from Longview, Texas to Norris City, Illinois, the "Big-Inch" pipeline (so called because it is 24 inches in diameter) will help alleviate the oil shortage in the East.

G.E. recently shipped, five weeks ahead of schedule, the first two of fifteen 1500-hp motors it is building for the line.

Built of cast iron to conserve steel plate, the motors will be used to drive centrifugal pumps in booster stations along the line. These pumps will keep 1,330,000 barrels of oil flowing at a rate of 4 miles per hour—a delivery rate of 300,000 barrels a day at Norris City.

By June it is expected that the remaining section of the line, 857 miles long, will connect Norris City and the Atlantic seaboard.